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Bulletin of
THE MENNINGER CLINIC

VOLUME 2 SEPTEMBER, 1938 NUMBER 5

THE RESULTS WITH METRAZOL AS AN ADJUNCT THERAPY IN SCHIZOPHRENIA AND DEPRESSIONS

BY WILLIAM C. MENNINGER, M.D.

The drug metrazol as an addition to the therapeutic armamentarium of schizophrenia has been used in this country less than two years[1]. In fact, the first paper by its originator Meduna[2] appeared only in 1935. It has, however, gained a very widespread use and although the literature on the subject is still meager it is increasing rapidly. Despite the fact that the therapeutic mechanism of metrazol is entirely unclear and its threat of possible organic brain damage is still undetermined, its occasional spectacular results have gained favor for its use in probably the majority of progressive institutions. Regardless of spectacular results, however, one must keep in mind that in no place has it been used for a sufficient length of time to evaluate adequately other than the immediate results. The following data are based on the treatment of 26 patients with 220 injections of metrazol, resulting in 167 convulsive reactions.

Indications: Metrazol was originally recommended in the treatment of various types of schizophrenia, with the best results being reported with the catatonic type (Kennedy[3], Finiefs[4]). Our own experience to date has been limited chiefly to its use in schizophrenia, but in addition four cases of depression have been treated. We are aware of unpublished reports of its use in many other types of mental illness. Most spectacular have been the results in the manic-depressive psychoses in the depressed phase as given by Bennett[5] who reported twenty cases treated with a recovery in every instance, and Low[6] who obtained 13 recoveries in 16 cases. Lebensohn[7] quotes Wahlmann as having used the drug in depressions with better results than in schizophrenia.

In all the papers in this issue, the writers are indebted for observations and treatment results made by their associates Drs. Norman Reider, Byron Shifflet, Robert Morse, Eugene Eisner, Joseph Pessin and Burk Dawson.

The factors determining the choice of schizophrenic patients to receive metrazol have been given little consideration in the reports in the literature. Except for stressing the apparent advantage of giving the drug soon after the onset of the illness and the likelihood of obtaining the best results in the catatonic form, no other indications are given. One gains the impression that Meduna, as well as others, regards the convulsive attacks as a specific treatment, with a specificity of sufficient certainty to be indicated in and prescribed for all schizophrenias, the earlier the better. There are obvious fallacies in such an attitude: the chances for improvement in schizophrenia are enhanced with any treatment program if administered soon after the onset. Our understanding of the nature of the illnesses classed as schizophrenia would not permit us to regard convulsions as being a specific cure: they may momentarily break a vicious cycle in the patient's psychomotor adjustment, but we cannot assume that they change the emotional conflicts nor prepare the patient to face any more adequately the reality problems in his particular environment. And finally, there is good reason to question the advisability of giving metrazol to every schizophrenic patient, even if we disregarded the possible organic brain damage from the repeated administrations. If the patient manifests some effort to remain loyal to reality, is reasonably accessible to psychotherapy and will make an effort to carry on a directed program of therapeutic activities, we do not consider that the use of metrazol is indicated.

Contraindications for metrazol include severe cardiovascular disease, the presence of a febrile reaction from any cause or any severe acute physical disease, or the presence of any brain lesion or organic damage. From our own experience we would second Meduna's original suggestion that menstruation is a contraindication for metrazol treatment. In one of our cases that improved, the patient was two months pregnant. In the literature reviewed, the only mention noted of the age of patients treated is that of Reese *et al.*[8] who stated that they rarely accepted patients over 40 years of age. Lebensohn stated that 45 years should be the upper limit. In our series, one patient was 57 years of age, one 56 and one, 54; the youngest was 18.

Method of Treatment: The drug metrazol is given in a ten per cent aqueous solution intravenously. The practice of producing a previous alkalinization of the patient as suggested by other workers[7] was tried but was discarded. We do not restrict free movement of the patient

during the convulsion. A padded tongue blade is placed between the molar teeth and the tip of the mandible is supported upward with firm pressure to prevent dislocation. The drug is injected intravenously through a large needle as rapidly as possible. After a latency period of a few seconds, a typical convulsive seizure results, lasting from fifteen to sixty seconds, beginning with a tonic and progressing to a clonic phase, and involving the entire body. The convulsion is followed by a period of confusion lasting from two or three minutes to as long as an hour. After rest in bed for two or three hours, the patient is again permitted to take part in his daily activities, and usually is able to do so without distress.

The Dosage: The question of the amount of metrazol to give, as to both single dosage and number of treatments, is undecided. We begin with an initial dose of three cubic centimeters, which, in more than half the cases, produced a convulsion. A tolerance to the drug develops so that the amount for successive treatments must be judged entirely by the reaction to the amount given previously. In only two cases, three cc. produced convulsions throughout the series. In nine cases, six cubic centimeters was the maximum dose; in twelve instances seven to eight cc. were required. In several other instances we gave a dose of seven cc. which did not produce a convulsion and within the next five minutes a second administration of eight cc. was given which did produce a convulsion.*

We have noted repeatedly that if a sedative is given the patient the night before, and particularly if given a few hours before the treatment, the amount of metrazol required to produce a convulsion is always markedly increased.

As to the number of injections, though the original recommendation was to give fifteen or twenty treatments at regular intervals, we regard this as inadvisable since in some instances a spectacular result may be apparent after three or four treatments and in others, an indefinite number seems to produce no results. Furthermore, we have found it

* In one instance, that of a 200 pound man, the first injection of 5 cc., followed immediately by 7 cc., produced no convulsion; in the second treatment, 10 cc. produced a convulsion; in the third, 13 cc. were ineffective; in the fourth, 15 cc. produced some spasm but no loss of consciousness; the fifth and sixth injections, each of 17 cc., produced a convulsion. The maximum dose mentioned in the literature reviewed was 16 cc. (Kennedy[8]).

impractical to attempt to schedule the metrazol treatments at regular intervals. In fact we have found it detrimental to follow such a plan, since in at least two instances we had the experience of having the patient show a very marked improvement after a particular treatment, only to regress after the next treatment. We are guided entirely by the individual response, and if the patient shows a favorable reaction following the convulsion we do not give further injections for a while. In four cases we felt that the maximum results were obtained with six injections. Thus, we are convinced that Meduna's original technique[2] of giving three additional convulsions after improvement is entirely unnecessary. Nor can we agree with Finkelman's[9] plan of giving an average of twenty-five or thirty injections (in one case 51!) in an attempt to bring about a result.

Attitude of Patient Toward Treatment: The use of metrazol as well as of insulin has been objected to, perhaps rightly[10], because of the psychological insult of the treatment to the patient. In every case of metrazol treatment we have witnessed varying degrees of apprehension, resistance and fear. Characteristically certain patients use the treatment to further their delusional system. Thus one patient believed that the treatment was "to help his circulation," and although apprehensive and fearful of it, he accepted it on this basis. Another patient consistently used it as an evidence that we were trying to punish her and "brow-beat" her into submission. In at least six instances actual force was necessary to put the patient to bed and invariably every patient regarded the approach of a physician for the treatment with some degree of fear.

This apprehension is manifested by most patients even on the initial injection, though in no instance to our knowledge did any metrazol patient witness the convulsion of any other patient. In fact, with the initial dose the majority of patients hardly knew what to expect and yet manifested a certain amount of apprehension. One patient refused to undress. A second one complained that he "didn't want to die." A third patient asked why we wanted to "kill her."

Physical resistance is shown not only by the refusal of certain patients to go to bed, but in many instances by combativeness. One patient used the device of crawling under the bed. Two made it a point to leave their room for the work shop, or some other place, before time for the treatment.

Some patients announce very positively that they will not take the treatment, though when all preparation is made, they offer no resistance. They do sometimes express extreme fear. Such statements as, "These treatments scare me to death," "Please don't do that to me," and other tearful and frightened protests are frequent. In one instance the patient associated the treatment with her room, and in fact with the whole hospital, so that when she went for a walk she would refuse to return to the hospital for fear that she might have a treatment, frequently becoming tearful and occasionally combative. Even for those patients who have greatly improved and perhaps understand that the treatments have helped them, the anxiety still remains and is manifested in such remarks as, "God, I dread this!" "Oh, goodness, how many more?" "Oh shoot, another one of those things!"

This conspicuous attitude of apprehension, anxiety, and fear on the part of the patient is undoubtedly of very great significance in whatever results are obtained by the treatment. It is our impression that in some instances this has been an important factor in driving the patient away from his delusional system since he felt that the doctor disapproved of the delusional system. He would, therefore, suppress it, rather than have the injection. Such improvement, however, must be regarded as spurious even though symptomatically the change in the patient's speech and conduct may appear to be very marked.

The Convulsion: As was indicated above, following the injection there is a brief latency period before the actual onset of the convulsion. In those instances in which it could be measured, we noted that there was no uniformity in the length of this period even in the same individual. Thus, in the same patient the latency period may be ten seconds on one occasion and sixty seconds on another. In a series of 106 injections we found the length of the latency period to be as follows:

	Instances	*Per cent*
5 seconds (or less)	6	5.7
6 to 10 seconds	25	23.7
11 to 15 seconds	39	36.8
16 to 20 seconds	21	19.8
21 to 30 seconds	7	6.5
31 to 50 seconds	5	4.7
Over 50 seconds	3	2.7
	106	

There was one latency period of 77 seconds, and one of 105 seconds.

The convulsion in some instances is preceded by an aura, though this seems to be exceptional. This aura may consist of a strangling cough or a queer noise in the nature of a grunt. In a very few instances it has been a shrill cry.

The duration of the convulsions themselves also varied widely, with the great majority lasting between thirty and sixty seconds. The following table indicates our observations:

10 to 30 seconds duration	3
31 to 40 seconds duration	12
41 to 50 seconds duration	34
51 to 60 seconds duration	20
61 to 70 seconds duration	3
71 to 80 seconds duration	8
81 to 90 seconds duration	4
Over 90 seconds duration	8

In the group lasting 90 seconds or more there was one case in which the patient showed a tonic phase lasting thirty seconds, and a clonic phase lasting four minutes. There were several cases in which the total length of the convulsion was between two and three minutes.

The relative length of the tonic and clonic phases varies rather widely. At least three patients showed a longer clonic phase in some treatments and a longer tonic phase in ohers. Probably in the majority of treatments the tonic phase is the shorter. In some instances the patient might even have a very brief clonic phase first with a few jerks, and then a tonic phase followed by a second clonic phase. It was frequently observed that the first convulsion was the longest.

Concomitant symptoms during the convulsion were frequently noted. In contrast to epileptic convulsions, frothing at the mouth is very rare. In only one instance in all of the convulsive treatments have we seen incontinence of either urine or feces, although Kennedy reported this occurrence as frequent. In three instances ejaculation with partial or complete erection of the penis occurred. Corroborating Lebensohn's observation, we have seen several patients whose hands automatically went to their genital region in the tonic phase of the convulsion. The development of "goose-flesh" was regularly observed in certain patients.

Certain consistent neurological findings were observed. The pupils

initially became very widely dilated, usually remaining so throughout the convulsion and then becoming noticeably contracted. The eyeballs usually rotated upward, remained there momentarily and then deviated either to the left or right. Usually the same patient always showed the same deviation, though in two patients the eyes occasionally would deviate to the right and at other times to the left. In one instance they rotated downward.

On two occasions in different patients the head was drawn sharply to one side, and in one of these cases the mouth also was drawn to the same side. A transient strabismus was observed in three different individuals, in two, an internal strabismus, and in the other a divergent strabismus. Nystagmus was observed on only two occasions, both times in the same patient. In contrast to the findings of other observers[9], a unilateral or bilateral Babinski was observed on only six different occasions, although it was regularly tested for.

Blood Pressure Observations: Blood pressure observations were made prior to the injection and five minutes afterward. In several instances they were made several times during this period so that we might determine what changes took place. One must assume that the anxiety was an important if not determining factor in the change. For instance, in one case prior to the injection, the blood pressure registered 115/90; the injection was given but the dose was so small that no convulsion resulted, and five minutes after the injection the blood pressure was 180/110. There was no physical struggle and no explanation for the very marked change, except that it might have been due to the side effects of the drug and to the extreme anxiety.

There was a very wide variation in the blood pressure readings which might be summarized by saying that in 68 per cent of the treatments there was a rise, but in 32 per cent there was an actual fall in the blood pressure. In one particular case in the course of a series of eight treatments, the blood pressure was increased in four instances and fell in four. We have observed in a few cases that during a series of treatments the initial blood pressure seems to rise consistently. Thus in the first treatment of one patient, his initial systolic pressure was 108 mm. of mercury and at the fourteenth treatment the initial pressure was 180 mm. In a second case the rise between the first and seventh treatments was from 160/98 to 202/98. We have had three cases in which the initial blood pressure was over 170, the highest being 202/98.

The change in the blood pressure between the time prior to the injection and five minutes afterward is shown in the following table:

Rise:	*Instances*	*Per cent*	*Fall:*	*Instances*	*Per cent*
5 mm. or less....	8	12	5 mm. or less.....	5	7.6
6 mm. to 10.....	15	22.7	6 mm. to 10.....	4	6.1
11 mm. to 15.....	4	6.1	11 mm. to 15.....	2	3
16 mm. to 20.....	7	10.7	16 mm. to 20.....	4	6.1
21 mm. to 30.....	5	7.6	21 mm. to 30.....	1	1.5
31 mm. to 40.....	4	6.1	31 mm. to 40.....	3	4.5
41 mm. to 50.....	2	3	More than 40 mm...	2	3
	45	68.2		21	31.8

Thus, one must assume that the factors causing the changes in the blood pressure here are so complicated that no conclusion can be drawn. In one of the most marked drops in blood pressure—44 mm. of mercury—the patient was extremely resistive to the treatment, had a great deal of anxiety about it, and had a very severe convulsion.

Post-Convulsive Behavior: Following the clonic phase the patient presents a picture of confusion and disorientation lasting for a period of a few minutes or as long as an hour or two. Certain features of this have been of special interest. The majority of patients have an amnesia for immediate events, particularly for the convulsion, and may indicate by their questions that they do not know they have had a convulsion. This amnesia, however, is apparently related only to the period of confusion since they invariably remember at least the fact that they have had a treatment. Occasionally they are tearful and in one instance a woman who had exhibited no tearfulness for any reason over a period of six months, cried very copiously following the second injection. Frequently they moaned or groaned for a period of a minute or two, or even several minutes following the convulsion. The more psychotic patients in some instances continued their previous activity (such as masturbation) even during the period of confusion; in one instance, the patient continued trying to knock his head against the wall.

A conspicuous feature of the post-convulsive confusion in some cases is a greatly increased erotism. This was present in two women patients and in two men. They became amorous toward the doctor or nurse, actually going so far as to propose sexual relations and wanting to be hugged, kissed, and petted. A probable modification of the

erotism was seen in many instances in which the patient made sucking or champing motions with the mouth. The automatic masturbation and occurrence of an erection and seminal emission were mentioned above. (For further discussion of this, see Dr. Grotjahn's article in this number of the Bulletin).

Another conspicuous feature of the post-convulsive confusion is fear and apprehension. In some instances this was so extreme that the patient held on to the nurse or the doctor, begging that he not leave. In two instances the patient called for "mother." Some patients expressed the fear of dying, or of terrific impending disaster.

TABLE I

Results in schizophrenia reported by other workers (which have been in part quoted from Lebensohn and Reese) include:

	CASES	RECOVERED OR IMPROVED
		per cent
Meduna[2]	110	49
Angyal and Garfas[6]	45	37
Friedman[7]	61	66
Singer[7]	90	45
Schilder[7]	15	26.6
Finkelman[9]	66	85*
Blalock[7]	8	0
Reese[8]	20	50
Gullotta[5]	10	0
Low[6]	35	22.9

* Under 6 months.

In the post-convulsive behavior physical discomfort has been observed rather frequently, consisting particularly of eructations and nausea. In a few instances vomiting occurred. Rather frequently a patient complained of headache or backache. In one instance nausea and vomiting continued for five hours after the injection, but in most instances the physical complaints disappeared within the course of two hours.

A fifth type of post-convulsive behavior is drowsiness which occurs in some degree in most cases, sometimes resulting in sleep in the course of 20 to 30 minutes after the convulsion. The sleep, however, is not prolonged nor necessarily deep.

From the therapeutic standpoint perhaps the most important feature in the post-convulsive behavior is the increased accessibility of the patient following the convulsion. This affords opportunity for psychotherapy. Following certain treatments some patients showed much greater friendliness, accessibility, and willingness to coöperate. Unfortunately, this may last only through the day of the treatment. In those cases who make a permanent improvement, however, it may continue subsequent to the day of treatment.

Accidents: While accidents in metrazol treatments have been reported frequently, in our own experience they have been limited to four instances in which the jaw was dislocated and two instances in which a shoulder was dislocated. We have had no fatalities.

TABLE II

Results in schizophrenia with metrazol

	DURATION						
	Less than 1 year	1–2 years	2–3 years	3–4 years	4–5 years	More than 5 years	Totals
Recovered					1		1
Marked improvement	1	3	1				5
Slight improvement	2	1		1			4
No change	2	1	2	1		3	9
Improved with subsequent regression		1		1		1	3
							22

Results: The results of treatment of *schizophrenia* with metrazol as reported by various writers are extremely difficult to evaluate. Both the methods and such individual factors as the duration of illness, the degree of improvement, and the proof of recovery, are difficult if not impossible to judge. The investigator's personal enthusiasm for the treatment may entirely bias his evaluation of results. Consequently, statistical survey of results are not strictly comparable.

Table II indicates our own results with the use of metrazol in schizophrenia. The status, however, of these 22 patients is the results of milieu and psychotherapy *in addition to* the metrazol, and it is incorrect to assume that the final result was due to the drug alone. Of the 22 patients, 16 had regular psychotherapeutic sessions with a physician.

The importance of the milieu and psychotherapy is perhaps best indictated in the case of one of the patients listed in the above table as showing "no change." Actually she recovered sufficiently to go home, but metrazol only seemed to make her worse and after 6 injections it was stopped. Over a period of several days following the last injection she continued to get worse.

Special mention should be made of the number of individuals showing improvement. Seven of the nine patients so listed are at home and apparently are adjusting satisfactorily, though we did not consider them well. Thus, the evaluation of our results may differ from similar evaluations in other institutions. If the patient is sufficiently improved to be paroled to the family it is not necessarily a remission, though in many institutions it would probably be called such. We limit the concept of "recovered" to a happy and efficient adjustment in the patient's own environment.

The results in the treatment of *depressions* of which we had four, have been spectacular. Two women aged 54 and 43 who had both been ill for more than a year and a half, completely recovered, one after 7 convulsions and one after 4 convulsions. Two additional cases of depression, one a man and one a woman, showed a decided improvement with metrazol and both are still under treatment. It is our impression that metrazol may be more effective for the protracted depression than for schizophrenia, an opinion held by Bennett[5] and Low[6], mentioned above.

Psychotherapy: It seems unscientific to assume that a patient is well, even though free of symptoms, unless he has some insight and understanding of the nature of both his intrapsychic and environmental conflicts. Therefore, it has been our practice to emphasize the importance of psychotherapy to supplement whatever other methods we may use, including metrazol. Consequently, in fourteen of these patients a special effort was made to help the patient through psychotherapy, and as one might expect, the greatest improvement was observed in those cases who were most able to profit from this help. In other words, a major advantage of the use of metrazol is that it tends to make the patient more accessible, and thus permits psychotherapy to take place which otherwise could not occur.

Insulin versus Metrazol: It is quite possible that the mechanism in operation in insulin and metrazol "shock" is quite different though it

is as yet unknown. There are many unpublished reports of the combined use of the two methods. Each form of treatment has a group of adherents and unfortunately the attitude is widespread of "either insulin or metrazol." The result is a controversy as to the relative merits of each (Wortis[11], Meduna[12], Sakel[13]).

After using insulin shock therapy in several cases, we began metrazol. Our results with insulin were not convincing and the relative simplicity and lesser danger of metrazol therapy has led us to continue its use exclusively.*

SUMMARY

The psychiatric treatment of twenty-six schizophrenic patients has been supplemented with metrazol injections—a total of 220 injections resulting in 167 convulsive reactions. The results with this group of patients have been much less spectacular than those reported in the literature, with one recovered, three noticeably improved, four slightly improved, and seven unchanged. The greatest advantage of metrazol convulsions seems to be that they increase the accessibility of the patient to psychotherapy. Our experience has led us to believe that neither a set plan as to the regularity nor the number of treatments should be followed rigidly and that once the patient's behavior and speech show a noticeable improvement, the convulsive treatments should be stopped. Furthermore, convulsive therapy does not have a specificity for schizophrenia and its use in every case of early schizophrenia is not justified. Our own results with four cases and reports in the literature indicate that the therapeutic effectiveness may be even greater in depressions.

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PSYCHIATRIC OBSERVATIONS OF SCHIZOPHRENIC PATIENTS DURING METRAZOL TREATMENT

By Martin Grotjahn, M.D.

In speaking of the psychology of schizophrenics undergoing metrazol treatment we are actually discussing two different and unknown things at the same time. Little is known about the psychology of schizophrenia; it is even uncertain how many different things are included in our conception of schizophrenia. Neither is it known what happens to the patient after the injection of metrazol. All that is known is the fact that metrazol injections are followed by more or less generalized convulsions, and that such convulsions may or may not be followed by some change in the further progress of the schizophrenic process.

The fact that insulin shock treatment is closely related to the metrazol convulsion treatment does not offer much help, for it only introduces a third unknown factor. Also, the two men who did the first work with metrazol and insulin in the treatment of schizophrenia do not offer much information about the theory and psychology of this new therapeutic approach. Sakel is of the opinion that insulin treatment may be compared to the knife of a surgeon: but it is not the knife, but the surgeon who uses the instrument skillfully that makes the treatment a success. Von Meduna does not take the psychological effect of metrazol treatment into consideration at all.

So the conclusion is justified that it is too early to speculate about the psychology of metrazol treatment before more material is obtained. In the following paper some observations will be given as the basis for some thoughts which later on may be incorporated in a more systematized psychology for this treatment. These observations may also give some outline of how to obtain psychological material by observation during the metrazol treatment. Physicians and nurses are often so overwhelmed by the impressive nature of the convulsion that their attention is directed chiefly to the observation and description of the physical and neurological facts, and as a result little is known about less impressive, but perhaps even more important, psychological processes involved in this kind of treatment.

In the following cases an attempt has been made to describe the individual's psychological reactions to various stages of the treatment.

Case No. 1. The patient, 26 years of age, has been ill for seven years and has been hospitalized for two years. His is a typical case of a slow hebephrenic, negativistic, autistic schizophrenia. It is practically impossible to communicate with the patient since he very seldom says anything, and then only, "No," "I don't know," or "Damned if I know."

Attitude before and to treatment: The patient received eleven injections, seven of which were followed by generalized convulsions. The first two times the patient was not resistant to treatment. During the last four injections he was relaxed, slow, and only once he was really resentful and had to be forced.

Behavior during the day of treatment: During the third treatment he had a seminal emission, which was noted after the treatment. Observation during the fifth treatment revealed that he had an incomplete erection during the convulsion, and immediately following it an emission, which happened in the clonic stage of the convulsion. Six of the seven convulsions were followed or accompanied by seminal ejaculations. After the treatment he was quite restless, often confused, but he was never responsive. He never spoke; he only smiled in his habitual silly manner, moaned and cleared his throat, and often repeated his stereotyped statements of "Oh, I don't know," and "Damned if I know."

Attitude of the patient toward the treatment after completion: Once he learned from the nurse that he was to receive another treatment the next day. When the physician left him without discussing this question he made jerking movements of the head to the left, imitating a convulsion of the tonic-clonic type of both arms and of the head. It seemed that the patient was trying to express with these movements that he knew what was in store for him. It is not clear how the patient learned that the treatment is connected with convulsions.

After the third metrazol injection the patient had a short period of increased activity in which he tried to kiss a nurse. When she did not comply he returned to his former inactive behavior.

Case No. 2. The patient was 36 years of age, a paranoid schizophrenic. The illness was of one year's duration. The patient was a cultured, attractive, business woman, economically self-sufficient.

Attitude before and to treatment: Seven of nine injections were followed by generalized convulsions. The patient coöperated fairly well, and took the treatment to prove that she was a "normal person," and that even such treatment could not hurt her.

Behavior during the day of treatment: The patient was confused, excited, grasped the nurses' hands. After the first treatment she had a feeling of relaxation "like I have never had since I came here." After the following treatments she was fearful and thought it would cause her to be "unbalanced" or that it would have a "lasting after effect." There was no change in her paranoid psychosis.

Attitude of the patient toward the treatment after completion: The patient thought that she knew exactly what went on during the convulsions. She felt the coming of the convulsion, and she thought that she had absolute control over whether or not she would lose consciousness. She thought that she became unconscious at will, that if she had resistance, and if she put her teeth together she would not have a convulsion. She did show her strong will power twice, and on those occasions she really did not have a convulsion. On the other seven occasions she thought that she should relax and "let herself go."

Case No. 3. The patient was a 22-year-old girl with a severe hebephrenic schizophrenic process of five years' duration.

Attitude before and to treatment: Eight of the nine treatments were followed by generalized convulsions. During the course of treatment the patient became more and more resentful of it, and at the end of the treatment she was even combative.

Behavior during the day of treatment: The patient was confused, restless, talkative, and liked to speak about sexual things. Sometimes she voided in bed after the convulsion. Once she remarked "I want my mama." Generally she was sexually excited, and often masturbated. After the only injection which was not followed by a convulsion she said, "I would just as soon have several more." Later on she said, "I hope you are not frightened by me." During the day of the treatment she was always somewhat more coöperative. Sometimes she tried to be aggressive and said to the nurse, "I hate you," but then it was very astonishing to see that she was apologetic about it. She said when she was somewhat oriented again some minutes after the convulsion, "I say my true love was you." A few minutes later she continued her thoughts about the doctor, "You have murdered me. You make me lose consciousness. Anything that hard would make a girl lose consciousness. It was very, very vulgar. My mother said I must not, I must not go; my mother said I must not go that way. Some people are very weak and some people are very strong, and some people are weak and some are strong. I am very weak."

Case No. 4. The patient was a 23-year-old girl, who had been sick for five months. She had a very slight, developing paranoiac system with rather hebephrenic behavior. Prior to the metrazol treatment she was given sodium amytal, during which good communication with

the patient was possible. At this time she forgot all about her illness, did not know where she was or why. She tried to become very affectionate towards her physician and tried to kiss him. This behavior was quite similar to her behavior following metrazol treatment later on.

Attitude before and to treatment: The patient received eleven metrazol injections and reacted nine times with convulsions. Usually she was fearful and resistive. Twice she urinated during the clonic stage and once she had movements of pelvis and legs which resembled coitus movements. After the convulsion the patient was confused and restless.

Behavior during the day of treatment: Once she defecated in her bed and put her hand in the feces. Several times she put her arms around her physician and was very much stimulated and sexually excited. This behavior was seen after the convulsion in which the patient had the coitus movements of the pelvis and legs. After five treatments the patient became noticeably changed. She was more communicative and coöperative, but only a few days later she was worse than before. During her improvement she made the remark, "I am not so confused."

Attitude toward treatment after completion: Later on the patient was able to describe her feelings during the treatment. "I lose my breath, they put a gag in my mouth. It has ether on it. I just feel like the whole world is coming to an end. After the injection I get very dizzy and things go around the room. The first thing you know I feel my heart palpitating and then I lose sight of all the faces. The doctor has an awful time in getting into my vein. Later when I vomit I throw out all the poison. I do feel like I am dying."

Case No. 5. The patient was a woman 30 years of age, who had been sick for eight years and had been hospitalized for five years. After a short period of catatonic excitement she became rigid, paranoid, hostile and aggressive.

Attitude before and to treatment: The patient had four injections, all of which were followed by convulsions. She refused to be undressed, tried to run away, was fearful and sometimes cried.

Behavior during the day of treatment: The patient was fearful and confused immediately following the treatment, but later on she became more sociable and followed her schedule.

Attitude toward treatment after completion: The patient said that the treatment was "awful, horrible, terrible," could not be described, and that it would be impossible for her to accept more. She promised to do everything asked of her. She begged to be permitted to prove that she could get along without it. It was the examiner's impression that she improved somewhat after two injections which were not followed by convulsions, but after which she lost a portion of her fear that something terrible was going to happen. It was the subjective

impression of the observer that these two treatments without convulsions had helped the patient more than all the treatments with convulsions.

Quite generally and according to the reports in the literature the attitude of the majority of the patients towards metrazol treatment is one of fear, anxiety and resistance. Usually, the fearful resistance increases with the length and duration of treatment and with the experience which the patient has had. This fear is surely not entirely based upon the information which the patient may gather from other patients who tell him what they know about the treatment. Even patients who do not communicate with the others show this fear, and no patient ever gives as the motive for his fear that he has heard something from other people that has frightened him. It is a fear of something terrible, horrible, something that can not be described in words. It is my impression that it is the unconsciousness, the feeling of being overpowered, which frightens the schizophrenic patients. Convulsions are only occasionally mentioned as the reason for the fear, but fear of death is often described in very distinct terms. Less resistant and resentful patients show in general a better improvement than the uncoöperative or combative patients. There remains, of course, the unanswered question of whether these patients would not improve without metrazol.

The fear before the metrazol treatment is sometimes of therapeutic value, and some of the patients show a slight improvement in order to demonstrate that they do not need further injections. More often it was the impression of the observer that a slight beginning of improvement was nullified by the patient's increasing resistance and fear which slowly became the outstanding feature of all his relations to the environment, and the patient developed a general behavior of combative negativism towards his physicians, nurses, and the whole situation. In cases like this, discontinuation and reassurance are strongly indicated in order that further withdrawal into complete negativism and autism may be avoided.

If, after injection of metrazol generalized convulsions occur, the loss of consciousness is always complete. Sometimes, and in the majority of cases, an aura is observed by the patient. This is sometimes accompanied by a feeling of dizziness; more often a blackness appears before the patients' eyes; seldom do they describe colorful visual sensations. Often the coming of the convulsion is very dis-

tinctly felt. Sometimes consciousness is not lost during the beginning of the convulsion and jerking of fingers or an arm is felt shortly before the loss of consciousness is complete and before the generalized convulsion starts. To a certain extent the convulsion seems to be dependent upon the inner attitude of the patient towards them and some schizophrenic patients believe that they have convulsions only when they consciously try to relax.

The facial expression of the patient is fearful, horrified, and is sometimes the expression of a person suffering severe pain. Occasionally, however, the face seems to express some kind of pleasure, even occasionally something like an orgastic climax.

After a period of unconsciousness which usually lasts from five to fifteen minutes, all patients recover gradually and there is invariably a state of disorientation. For some unknown reason we were never able to observe a confusion which lasted longer than two hours, such as is described so often in the literature. The patients are restless, try to orient themselves and are usually unwilling to speak and to answer questions. If later on they begin to speak they usually ask some question about orientation of persons, place and events. They usually fall asleep for a few minutes or as long as one or two hours.

If there is any immediate change in the patient's behavior at all it is an increased accessibility and responsiveness. Mostly they feel helpless and crave help, protection, reassurance; they like to have an opportunity to love and to earn love. They are tearful, and some patients who have been observed for some time before metrazol treatment cried for the first time during their hospitalization. It is seldom that the patient has increased hostility after the injections, but it may be observed occasionally. States of sexual excitement are not rare. Male patients have attempted to pull the nurse into the bed, and female patients have made gestures of sexual desire toward the physicians. It seems that patients undergoing such sexual excitement have a fair prognostic outlook, but this, too, is by no means always the case.

If the improvement is not interrupted by a new set-back then the patient shows less obviously psychotic trends and a less autistic, more accessible and more responsive attitude, especially in his emotional relation to his immediate environment. Often he becomes more active and interested in some kind of occupation. Such improvement may last for hours, or for days, but if it is possible to establish a psychotherapeutic communication, it may become permanent.

Usually it is very difficult to start a discussion about the metrazol treatment even with improved patients after the treatment is finished. The patients prefer to repress the whole incident, and they resent any attempt to touch the more or less complete amnesia. They remember the aura, the coming of the convulsion; they felt overpowered, helpless; they remember that there was something like "the end of the world;" they also remember the death fear, the feeling as if they were being killed; and they do not wish to go through it again. Male patients are often astonished and pleased to learn that they had an ejaculation, and the women occasionally mention memory of sexual pleasure. They felt "raped" or they felt that "it came." They said it was a "kind of pleasure" but "no more so than masturbation." They sometimes remembered that they had had pelvic contractions or different kinds of vaginal sensation. It is not clear if these faint recollections are reliable observations or if they are related to the well known schizophrenic trend to sexualize and symbolize everything. It seems that there is a connection between convulsions and some kind of sexual gratification. Further observation may show whether and how far a conscious death fear before and during the convulsions may be connected with some kind of sexual orgasm.

Last, the often-heard opinion, that all patients have a complete amnesia for the convulsions, will be discussed. The fact that they do not remember them does not mean much because sometimes it is possible even in cases of organic amnesia to diminish the degree of such amnesia by the process of psychoanalysis. On the other hand, occasional remarks of patients that they do remember the convulsions are not reliable beyond doubt. Two of our patients imitated convulsions, and both did it during a time when they were mute and absolutely negativistic. It was difficult to believe that they had learned about the nature of the treatment from someone else. But even more astonishing was the fact that both of these patients imitated their convulsions in a way that was significant for them and them only. They had a distinct type of convulsion, in the one patient beginning in the fingers, in the other beginning in the face, and in their imitations they showed these distinctive ways of initiating the convulsion. Both of them used the imitation to show the physician without words that they knew about the treatment. Another patient repeatedly and frequently assured her physician that she always felt the convulsion.

She did not feel the coming of the convulsion only, but the real convulsion also. In this case, as in the discussion of the probability of sexual sensation, it may be that schizophrenic thinking and conception may color the patient's statement. A proud, narcissistic, God-like, paranoid schizophrenic woman can not think she could ever lose control of herself.

At the present stage of our knowledge about metrazol treatment, it would be much too early to start speculations about the mechanisms, dynamics and symbols of this treatment, the symptomatology of which we have just begun to study. It is, therefore, self-evident that outlines of the psychotherapy of metrazol patients can not be given now, but we may state that according to our experience metrazol treatment promises success only when combined with psychotherapy. It may sound more modest to avoid the expression "psychotherapy" and to substitute for it "psychiatric care," meaning the establishment of a friendly, kindly, understanding, helpful attitude of the physician towards his patient. "*Quieta non movere*" should be the ideal of such work. Everyone who is interested in the psychology of the unconscious and in analytic therapy is in danger of being too ambitious with these sensitive schizophrenic patients. Unfortunately some psychoanalysts may stir up too much unconscious material, which will only increase the patient's resistance and his psychotic withdrawal. Without speculation it may be assumed in accordance with psychiatric experience that the convulsion-shock of the metrazol convulsion enables the narcissistic schizophrenic patient to make some kind of transference. Usually psychotherapy with these patients is doomed to failure because they depend stubbornly on their autism in the face of every temptation, and if under favorable conditions a feeble beginning of positive transference is established, the patient becomes frightened and immediately starts a new withdrawal from reality.

The psychiatrist whose goal is to establish a friendship between the patient and his physician regards such a new-gained relation of the patient to reality as a first step towards a new readjustment. If metrazol treatment of schizophrenic patients does not accomplish more than a first stimulation in this direction, then everyone who knows the difficulties in the therapeutic approach to this narcissistic psychosis will be satisfied that some progress has been made.

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A PROGRAM FOR THE EXPERIMENTAL PSYCHOLOGICAL INVESTIGATION OF CONVULSION THERAPY

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The reports to date on the use of insulin and metrazol in the treatment of schizophrenia show the undoubted importance of these therapies. Nothing of similar importance in the somatogenic approach to the psychoses has occurred since the introduction of malarial therapy for paresis. It is not our purpose to summarize the work which has been done with insulin and metrazol, but rather to point out certain shortcomings in the criteria advanced for the efficacy of the treatments and to outline a research program which may overcome some of these. Certain deficiencies in the earlier research reports have already been mentioned in the literature, most specifically in the paper of Rymer, Benjamin and Ebaugh (6).

With regard to the criteria for the efficacy of and the indications for shock treatment the following points are worth noting.

1. The criteria for the designations "full remission," "recovery," "social recovery" and "improvement"—are somewhat arbitrary and variable. Sakel's (7) criteria for insulin shock and those advanced by Frostig (3) are definitely stated but they depend almost solely upon the judgment and clinical experience of the observer. The same criticisms fit the criteria applied to metrazol shock.
2. The pre-therapeutic and post-therapeutic pictures have generally been stated in terms of the clinical pictures; little attempt has been made to evaluate the underlying changes in personality structure.
3. There are as yet no reliable criteria upon which to base a prognosis. Some investigators claim that certain types of schizophrenia respond better than others. However at best these represent only trends, and have not been found to hold in all cases.

Since the success of the therapies in some cases is unquestionable, it is highly desirable to arrive at some basis for: (a) indicating the cases which will improve enough to justify treatment; (b) distinguishing between transitory and permanent improvement; (c) indicating when to terminate the treatment.

Methods which differentiate persons more thoroughly must be

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found to make possible an adequate evaluation of the treatments. A therapeutic method is valuable when it increases the number of recoveries, or decreases the time necessary for them to occur. The determination of the efficacy of any particular therapy necessitates a precise knowledge of the patient's condition as well as of the conditions under which the treatments are given. Treatments with insulin and metrazol cannot be evaluated unless the reported results include in addition to the number of hours of shock, the dosage, etc., at least the age of onset, the sex, a detailed clinical picture of the psychosis, and its duration. The need for such data in connection with any medical therapy has been pointed out many times but some of these data are lacking in nearly every report on the convulsion therapies. Frostig (3) has formulated a plan which includes these items and it would be advantageous for all investigators to follow it. However, because statistics on the frequency and duration of spontaneous remissions are unreliable, such a plan should provide for a control group not given treatment. Even more such a plan should provide for objective criteria to measure the pre- and post-treatment picture in *both* the test and control groups.

The facts which establish the conditions necessary for a favorable prognosis are obtained from two sources: clinical case studies and experimental studies. By a clinical study we mean one which has therapy as its primary purpose, and in which the conditions, instead of being rigorously controlled, are altered when therapeutic conditions demand it. Certain prerequisites of the experimental method assure the removal of sources of error which invariably occur in clinical practice. For this reason objective psychological tests and experiments may throw considerable light on the criteria for the usefulness of the convulsion therapies. A research program is now underway at the Osawatomie State Hospital in an attempt to determine the value of experimental psychological procedures as objective criteria.* The present experiments are being performed on metrazol patients. The groups include chronic as well as acute cases. We are particularly interested in running some chronic cases because it has been suggested

* This work is being done by the junior author under the direction of the senior author as a part of a research program on insulin and metrazol at the hospital. The treatments are being administered by Dr. John Russell. Dr. Ralph M. Fellows is responsible for the integration of the various parts of the program.

that the treatment may have its greatest immediate use in reducing the number of chronic patients in the hospitals through creating remissions.

The experimental procedure involves giving a battery of tests to both the group under treatment and the control group and repeating the tests at the termination of treatment. Other tests and observations are made during the treatments in the attempt to find indications for terminating treatment. The battery of tests now in use includes:

1. The Revised Stanford-Binet Scale (8). An intelligence test is used because the different types of items in it give a good sample of the individual's behavior. It is possible that the pre- and post-therapeutic behavior on some of these items may prove significant or will give clues as to where to look for those that will be significant. The change in I. Q. may prove to be a rough measure of the recovery of the individual.
2. The Rorschach Test (1). This test, the use of which has already been suggested in this connection (6), gives some measure of the perceptual and cognitive aspects of the personality.
3. The Modified Dembo Technique (2). The subject is placed in a frustrating situation, and his subsequent reactions are noted. Preliminary studies by Brown (2) indicate that the reactions can be used for diagnostic purposes.
4. Measure of the effect of success and failure on the level of aspiration. This is a test especially devised by the authors and is based on the study of Hoppe (4). The individual is shown a design and told that he will be asked to construct it from blocks. After some preliminary trials he is asked to set his time for the next construction. Success or failure is determined by the examiner through falsification of real time. The effect of both on the subsequent level of aspiration is noted.
5. Luria Method (5). This test is an objective measure of emotional stability, based on physiological and motor responses to a controlled association test. Critical words related to anal and oral sexuality and to the patient's psychotic content are used. It may be that improvement can be correlated with reduced emotional responses to such words.

The battery of tests just described should give a considerably more precise picture of the structure of the personality than we have at the present time from the ordinary clinical interview and physician's observations of uncontrolled behavior in the hospital. From the intelligence test we should get information about the integrated

problem-solving ability of the individual, from the Rorschach test the present nature of the individual's cognitive and perceptual processes, from the modified Dembo test his reactions to a frustrating situation, from the measurement of the effect of success and failure on the level of aspiration something of the individual's reaction to social pressure, from the Luria technique evidence of definite complexes or conflict situations.

At the present time a preliminary investigation to test the practicability of the method and to familiarize the experimenters with the technique has been completed on seven cases. The results so far make us believe that the experiment is certainly worth continuing. This research program is being published before completion in the hope that similar ones will be tried in other hospitals. We have illustrated the importance of experimental work in this paper with reference to shock treatment because of its great immediate interest and importance. The criticisms made and the general plans for research are applicable to all therapies. The authors believe that in research directed toward the evaluation and control of psychiatric therapy the cooperation of the experimental psychologist and the clinical psychiatrist has great promise.

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NURSING CARE IN SHOCK THERAPY*

By Isabel Erickson, R.N. and Mary Ramsey, R.N.

In psychiatry "shock treatment" has become a frequently used measure for the treatment of schizophrenia as well as for certain other psychoses. The term "shock" is applied to pharmacologically produced coma or convulsions, using insulin in large doses or metrazol, the cardiac stimulant. The advantages of psychiatric training for the nurse assisting with shock therapy cannot be overemphasized. Aside from her function in assisting the physician with the treatment, probably the nurse's most important function is to reassure the patient, first by her presence, and then by her interest, friendliness, and kind understanding. Anyone who has seen this treatment cannot help but notice the anxiety and apprehension these individuals evidence at the thought of the treatment.

Nurses entrusted with the nursing care of patients during shock therapy should, if possible, have an opportunity to study or at least to observe such patients under treatment. In our hospital the nurses were given an opportunity to see some moving pictures of metrazol treatment before it was given to any of our patients. Such an opportunity is quite desirable because it enables the nurses to be more capable in the nursing care, more reassuring to the patient, and to assist more ably the physician. It is more efficient for all concerned to have the same person or persons assist the physician throughout the course of treatment for any particular patient for two reasons: first, the patient gains reassurance and responds to someone in whom he has developed confidence, and second, the nurse becomes acquainted with the doctor's routine and may anticipate his needs for the treatment.

METRAZOL THERAPY

Preparation of the Tray: The metrazol therapy tray contains:

2—10 cc. syringes (or 20 cc.) sterile
2—18 (or 20) gauge needles, sterile
Metrazol solution (in 25 cc. vials) 10% aqueous solution
Rubber tourniquet
Alcohol sponges with alcohol

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* Read at the Central Neuropsychiatric Hospital Association Meeting, Chicago, March 18, 1938.

2—Heavy gauze-padded tongue depressors
Tongue clamp
Sodium amytal for intravenous use
Emesis basin

Other necessary articles include:

Record sheet
Restraint sheet
Stethoscope and sphygmomanometer
Watch (to time accurately the duration of the latent period and convulsion; a stop watch is best)

Preparation of the Patient: The patient is given only a light breakfast, perhaps coffee, toast, and orange juice, as a precaution against aspiration during the convulsion. He is permitted to be up and about until time for the treatment which is usually given about 9:30 in the morning. The individual is bathed and placed in bed in a loose fitting gown with a restraining sheet across his chest. This prevents him from sitting upright or from throwing himself from the bed during the convulsion. The patient should remove dentures, either bridge or plate, and if he is unable to do so, the nurse should remove them. Before the treatment the patient often becomes very fearful and needs a great deal of reassurance from the nurse.

Care During the Treatment: The patient should have a padded tongue blade placed between the molars to prevent breaking the front teeth and biting the tongue and support by pressure should be applied under the chin to prevent dislocation of the jaw during the convulsion. This responsibility may be assigned to the nurse. Care must be taken during the seizure when attempting to restrain the patient to prevent other dislocations. It is the nurse's responsibility to observe and record data regarding the injection and the convulsion.

Observations: During the course of convulsions it is important to observe and record the following: the condition of the patient before the attack, the aura, symptoms such as nausea, increased perspiration, pallor or redness of the skin, and the nature of the attack. Perhaps the attack itself may best be described by answering questions: Were the seizures tonic or clonic, or both? What was the duration of each phase? When did each appear? Did they start on the right or left side, in the face, hand, arm, or leg? Did the convulsion become

generalized? Did the patient injure himself? If so, how, where, and of what severity[6] Did the eyes roll? If so, in which direction? Were the pupils dilated or contracted? Was there any obvious inequality? The above observations are of importance to the physician but are of little value if inaccurately recorded. Immediately following the seizure the patient's behavior should be accurately observed and recorded. We have devised a form on which each treatment is recorded.

REPORT OF METRAZOL TREATMENT

Physician.....

Patient..... Date..... Injection No..... Convulsion No.....

Attitude prior to treatment.....

.....

Blood Pressure..... Pulse..... Respiration.....

Injection Time..... Amount..... Aura.....

Latency Period (in seconds)..... Tonic Phase..... Clonic Phase.....

Incontinence..... Ejaculation.....

Cyanosis (none, slight, moderate, severe).....

Neurological Observations (eyes, babinski, pupils, etc.) .....

.....

Time (Note time responsive to recognition, to questions; nature of post-convulsive restlessness and confusion; somnolence; blood pressure and pulse 5 minutes after injection; time patient arises).

.....

.....

Accidents during and complications following treatment:.....

.....

General Attitude through day of Treatment.....

.....

.....R. N.

Care Following the Treatment: A nurse should remain with the patient for at least 30 minutes after the convulsion is over. The patient should be encouraged to remain in bed for one to two hours following the treatment. Sometimes he is confused and quite irritable and also may be nauseated if he attempts to get up. A regular diet may be served at noon. The patients under metrazol treatment are encouraged to carry on an active schedule as prescribed by the physician starting the afternoon following the treatment and continuing until the morning preceding the next treatment.

INSULIN THERAPY

Just as in metrazol therapy, the nurse has a major responsibility for the success of shock therapy using insulin. The actual procedure, however, and her functions are somewhat different, as indicated in the following outline:

Preparation of the Insulin Tray is a special assignment and responsibility of the nurse. The contents include:

Sterile section

2—50 cc. syringes
1—10 cc. syringe
1—2 cc. syringe (or larger)
1—insulin syringe
Needles (let the physician choose the needles he prefers before starting treatment)
2 or 3 small hypodermic needles
3—18 gauge needles
2—19 gauge needles
2—20 gauge needles
2—22 gauge needles
1 pair sterile forceps

Non-sterile section

2 ampoules of intravenous glucose
2 ampoules of coramine
3 ampoules of caffein sodium benzoate
ampoule of insulin
1 ampoule of adrenalin chloride 1/1000 solution in hyoodermic syringe (ready)
2 ampoules of adrenalin chloride unopened

Other heart stimulants as preferred
Record sheet
Stethoscope and sphygmomanometer
Nasal tube or duodenal tube
Karo syrup or oral glucose; amount will be specified by physician
Bottle of alcohol
Sponges for hypodermics
Tongue gags
Tourniquet
Emesis basin
K. Y. Lubricant

Preparation of the Patient: The physician leaves the order that the patient's breakfast be omitted on the morning of the treatment. Some patients must be observed carefully to prevent them from secreting food under the pillow or in various places in the room. Temperature, pulse, respiration and blood pressure are taken and recorded. The patient is placed in bed wearing a loose fitting gown. The room is darkened to assist him in resting.

Care During the Treatment: At the Menninger Sanitarium it has been the practice for the physician to give the injection of insulin about 7.30 in the morning. He returns to the patient 30 minutes after the injection is given and remains with him constantly until 30 minutes after the termination of the shock by the administration of glucose.

The nurse should have the insulin tray and the patient in readiness when the doctor arrives. It is her responsibility to record observations of the patient's behavior and to assist the doctor throughout the treatment. If the patient becomes markedly excited he may need to be restrained with canvas restraints. Usually this excitement soon subsides but the restraint helps to protect the patient from bodily injury and quiets him. One form of excitement which is often observed is a panicky demand for food. In an effort to remain awake the patient may request water. However, he should have only small amounts of water though these may be given at frequent intervals; if water is given in large quantities it produces nausea and vomiting. It is advisable to prop the patient's head to one side to permit the saliva to drain from the the side of the mouth and so prevent aspiration. It is even more desirable for the same reason to have the patient lie on his side, and in no instance should he be permitted to lie flat on his back with his head unturned. Care must be taken to prevent the patient from throwing the covers from his body during wet shock when he is perspiring freely. If the physician permits the patient bathroom privileges he should be accompanied by the nurse.

Observations: It is usually the nurse's function to record all procedures as well as observations: the time of insulin injection, the onset of coma, the occurrence and nature of convulsions, neurologic phenomena, and termination of shock. It is expected that at certain ordered intervals, she will observe pulse, blood pressure, and respiration, note the "wet" or "dry" phases, and record remarks and behavior of the patient throughout the treatment. It is most helpful if these data can be recorded on a special treatment record blank.

Termination of the Coma: Convulsions or other neurologic complications are rarely so severe as to necessitate termination of the shock. They may, however, be terminated by the administration of glucose by mouth or by nasal tube. If in deep shock the patient is usually unable to take the glucose by mouth, though in light shock this is possible. He should be kept well covered to prevent chilling. Close observation is necessary for a period of an hour or an hour and a half after the glucose has been given by the physician because of the danger of delayed shock. As soon as the patient is sufficiently awake he should be served food high in carbohydrate content. When it is difficult for the patient to take the necessary amount of food because of nausea and lack of appetite, he must be encouraged to drink orange juice and to take additional nourishment throughout the afternoon. Patients may complain of severe headache which is often relieved by drinking sweetened fruit juices or by eating candy. However, medication may be necessary. During a course of treatment these patients often have sleepless and restless nights and require a sedative.

It is very important to keep accurate behavior charts of the patients having shock therapy so that the physician can evaluate the assistance the insulin is giving toward recovery. In some instances it can be observed that at definite periods during each day the patient is more alert than at other times. The most clear cut improvement is observed as a rule immediately after a treatment. Clarity and coherence often fade as the day progresses. The nurses and therapists should encourage the patient to carry on an active schedule during the afternoons and on the rest days.

Summary: We have attempted to point out that the nurse's responsibility in shock therapy is an extremely important one and that her efficient functioning is a major factor in the success of such treatments.

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